

stulatus, of which he said "Habitus *J. bulbosi*." Several recent collections from eastern North and South Carolina and Georgia agree with Michaux's material and are clearly depauperate *J. marginatus*.

The coarse plant with elongate and nodulose rhizome and solitary culms which has been recently passing as *J. aristulatus* is *J. biflorus* Ell. Most of the southern material has very open inflorescences with remote (1-) 2-3 (-6)-flowered glomerules; while many of the northern and some of the southern specimens have a compact inflorescence and approximate glomerules of 3-6 flowers. While these extremes seem to have no definite geographic localization, loose inflorescences sometimes occurring in the North and dense ones in the South, they are readily recognizable at a glance. Indeed it is surprising that two such striking extremes have no trenchant technical characters, and the situation recalls that in *Juncus macer*. We consequently propose the plant with dense inflorescences as a form, rather than a geographic variety.

JUNCUS BIFLORUS Ell., forma **adinus**, forma nova, inflorescentiis congestis, glomerulis approximatis.—TYPE: dry upper sandy and peaty beach of Saul's Pond, Brewster, MASSACHUSETTS, September 7, 1919, *Fernald* in Plant. Exsicc. Gray. no. 350 (in Gray Herb.).

(To be continued.)

POLLINATION OF THE ERICACEAE: CHAMAEDAPHNE AND XOLISMA¹

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CHAMAEDAPHNE CALYCVLATA MOENCH

THE leather-leaf, *Chamaedaphne calyculata* Moench, is a low shrub, 2 to 4 feet tall, with slender branches, growing in wet meadows, and bearing coriaceous evergreen leaves which are scurfy beneath. The flower-buds are formed the previous season and open during the following spring from April 20th to May 29th.

The flowers are nodding, 5½ mm. in length, solitary in the axils of the small upper leaves of the terminal racemes, which consist of 10 to 15 flowers. The white corolla is oblong, urn-shaped, narrowing at the apex, with five recurved teeth.

Stamens ten, included in the corolla, filaments white, anthers reddish-brown, awnless, terminating in elongated tubes and opening

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by terminal pores. Each anther-tube is tipped by a triangular process. When the proboscis of a bee is inserted into a newly opened flower, it strikes against one of these processes, causing the powdery pollen to fall out of the opening of the corolla on the bee's head. Since the bee inserts only its proboscis into the corolla, should it later visit a flower

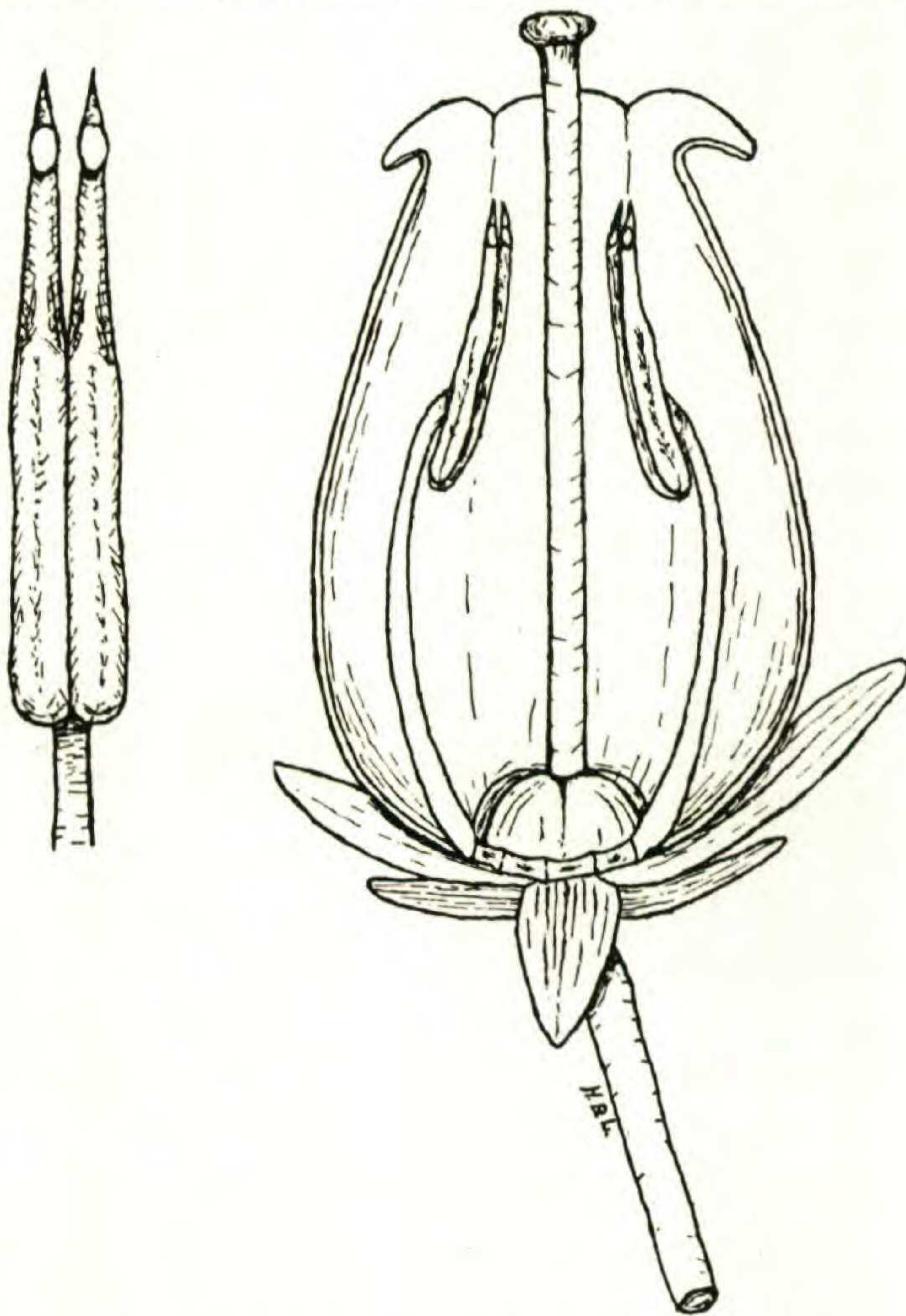


FIG. 1. CHAMAEDAPHNE CALYCVLATA: *a*, longitudinal section of mature flower, $\times 10$; *b*, stamen, $\times 20$.

with the stigma protruding, its head is certain to come in contact with it and ensure cross-pollination. Pollen white. Nectar is found sparingly between the corolla and the base of the stamens, but it is probably secreted on the disc and escapes between the filaments to the wall of the corolla.

In the bud the style is about the same length as the stamens, with a capitate pink stigma, which later becomes brown. After dehiscence the style increases in length until the stigma protrudes in mature flowers about one millimeter. If pollen falls from the anthers while

the stigma is in the mouth of the corolla, self-pollination will take place.

The following insects were taken on the flowers, all seeking nectar:

APOIDEA: APIS MELLIFICA L. ♀; BOMBUS VAGANS Sm. ♀ ♂; B. TERNARIUS Say ♀; B. SP. ♀; MACROPIS CILIATA Patt. ♀; NOMADA BELLA Cr. ♀ ♂; N. SUBRUTILA Lovell & Ckll. ♀ ♂; ANDRENA VICINA Sm. ♀ ♂; A. WEEDI Vier. ♀; A. CRESSONII Robt. ♀.

BUTTERFLIES: LYCAENA PSEUDAGIOLUS Boisd. & Lec.

DIPTERA: BOMBILIUS SP.

Chamaedaphne in this locality blooms while the weather is cold and stormy and is not frequently visited by insects. The above list of species is the result of many and long continued observations. Though there was an apiary not far away only one honey-bee was seen seeking nectar. The visits of the bumblebees were few and very brief—one species was not captured. Andrenid and Nomadine bees were the most frequent visitors. A bee-fly flew to a few flowers but escaped capture. The supply of pollen was meager, and not many seed capsules developed.

XOLISMA LIGUSTRINA BRITT.

Privet Andromeda, *Xolisma ligustrina* Britt., is a small, deciduous-leaved shrub, seldom more than 8 or 9 feet tall, usually growing in damp or wet land but also found in dryer soil at Waldoboro. The dry panicles of seed capsules of the previous season still remain on the branches, when it blooms again in July. The nearly globose white flowers are in terminal paniced racemes, which are many-flowered and leafless. The corolla is constricted at the mouth, with five recurved teeth.

The ten stamens are included in the corolla and are adherent to its base. The filament is flat with the upper portion curved into a U-shaped bow, which acts as a spring to hold the anther-pore against the style, preventing the escape of the pollen from the pendulous flowers. The anthers are brown, and attached to the filaments near their bases, opening by large terminal pores which are directed inward. In buds about to open, the anthers were mature, the pores open, and when the filaments were bent outward and allowed to spring back, the pollen was discharged. The yellow pollen grains are in tetrads.

The green, thick style is about two millimeters long with a small rounded stigma, which appeared to be in a receptive condition in newly opened flowers. The stigma stands slightly in advance of the

mouth of the corolla, rendering the opening so small that bees visiting the flower can not fail to come in contact with it.

According to Knuth¹ the flowers of the closely related genus *Andromeda* are homogamous. In *X. ligustrina* several panicles, which while in bud were covered with fine netting to exclude all insects, produced many seed capsules, though not as many as clusters of flowers which

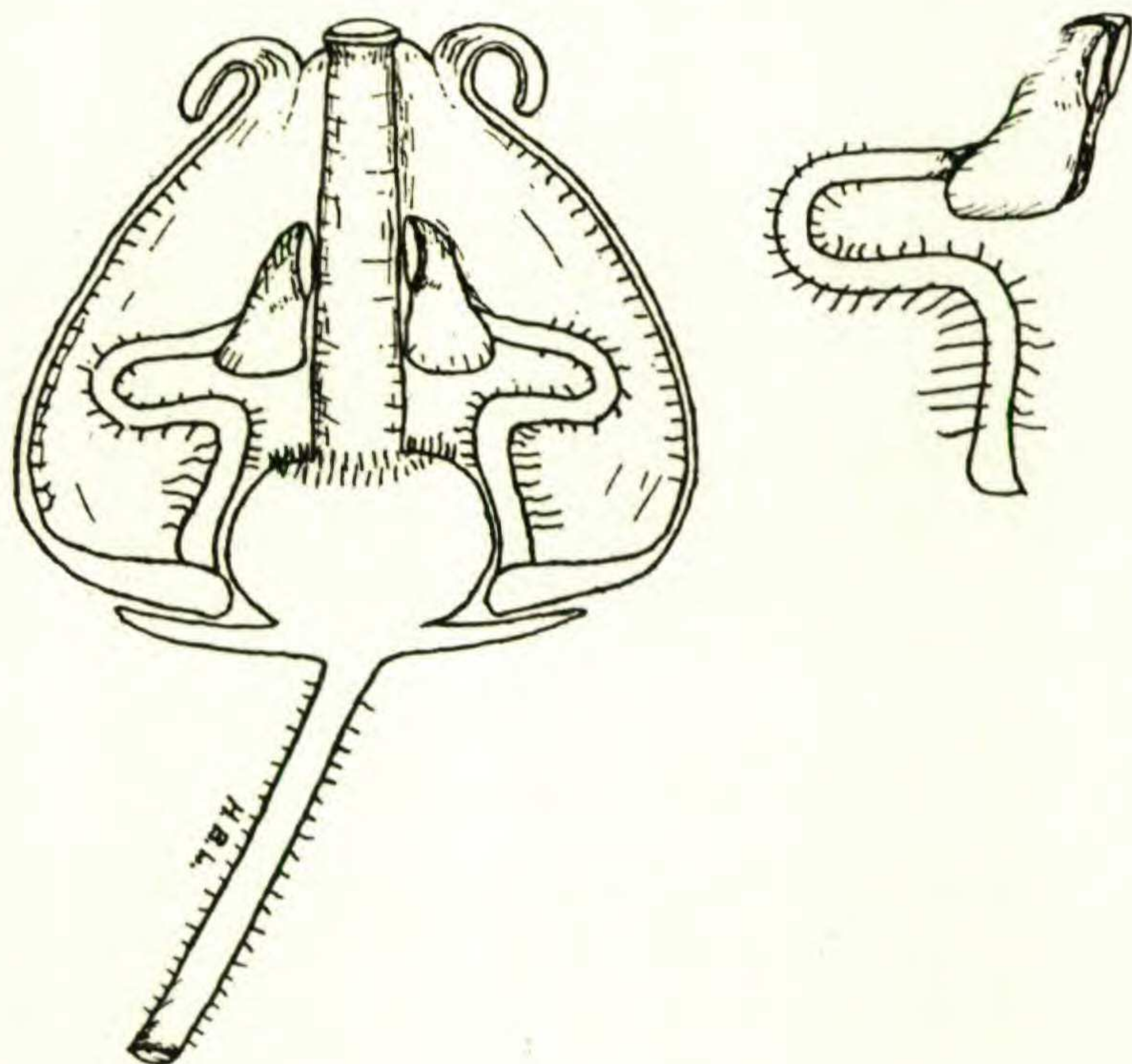


FIG. 2. *XOLISMA LIGUSTRINA*: *a*, longitudinal section of flower, $\times 10$; *b*, stamen, showing bow in filament, $\times 15$.

had not been covered. This species is evidently capable of self-fertilization.

Nectar is apparently secreted by a rim of glandular tissue at the base of the corolla, where it accumulates in considerable quantity. The inside of the corolla and the filaments are covered with hair, which protects the nectar.

Bumblebees were repeatedly observed sucking nectar, their tongues passing at first between the bowed filaments; but later, as the bees turned half or three-fourths of the way around the flower, their tongues passed outside of the filaments. The tongue could be clearly seen through the translucent corolla.

While bumblebees were rather rare on the bloom of the Privet *Andromeda*, observation of a large bush for two hours showed that

¹Knuth. *Blütenbiologie*, II, pt. 2, p. 37.

all the flowers probably receive several visits during anthesis. *Bombus ternarius* especially was quite abundant, and one specimen was seen to make sixteen visits in one minute.

The flowers are pollinated almost exclusively by bumblebees, though they were not very frequent visitors in the open woodland, where our observations were made. Only a single specimen of the honey-bee, of the *Eristalis* fly, and of the female of *Augochlora* were collected. The crab-spider *Misumena vatia* was present in a few flower clusters, and in one instance had captured a worker of *Bombus vagans*.

The following visitors were collected between July 9th and 19th:

APOIDEA: PSITHYRUS LABORIOSUS Fabr. ♀ ♂; BOMBUS VAGANS Sm. ♀; B. TERRICOLA Kirby ♀; B. TERNARIUS Say ♀; AUGOCHLORA CONFUSA Rob. ♀.

DIPTERA: ERISTALIS FLAVIPES Walk.

WALDOBORO, MAINE.

LEPIDIUM LATOFOLIUM IN CONNECTICUT.—*Lepidium latifolium* L. is sure to interest any observer on first acquaintance. It is a coarse, somewhat woody plant, 1–1.5 m. or rarely 2 m. tall, with pallid, glaucous stems leafless below at flowering time and a large, stiff panicle. Its multitude of fine white flowers in small corymbs terminating the branchlets soon give way to maturing fruit and an unsightly bare appearance. An extensive underground root-system makes it a bad weed in cultivated land.

In Europe its natural habitat seems to be salt marshes and sea-shores. In such situations it was my good fortune, on July 5, 1934, to find great quantities of the plant, beautifully in flower, in Stamford and Darien, Connecticut, from Cove Island intermittently along the salt shores of Holly Pond, or in some areas in solid ranks for long distances, to the outer reaches of Noroton Bay on Pratt's Island, where it clung tenaciously to wave-washed clefts in exposed ledges.

Extensive salt marshes in Darien have long been reclaimed by gravel "fill" from the Bay; on some of these areas near the shore are many colonies or broad expanses of the plant. It also grows in some fields, roadsides and even in a privet hedge, all well beyond the influence of salt water.

While in flower it is very conspicuous as far as the shores are visible, along a total shore-line of more than three miles.

Mr. Ludlow Griscom at a later date independently observed an